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that part of the bed where she lay, retains the shape of a pregnant woman. If it may be credited, birch grows in in this island, but not in the others; for they are all without trees. Here are white hares, which are hunted with dogs. In it is also abundance of birds called Leris, also of fish and other kinds of fowl.

It contains likewise mines of gold, lead and iron, and many other valuable things.

Gransay, 30.

A small island, but well-cultivated; very dangerous for ships.

Southay, 31.

Southay, or the southern island, is now uncultivated, but formerly abounded with cattle. All the natives ended their lives on the same day. This is no fable, but a real fact worthy of the notice of christians. On the festival of our Saviour, Jesus Christ, as they had no church of their own, they were obliged to go to a neighbouring island; and having embarked in a boat, both old and young, a sudden storm arose, and the vessel sunk through the violence of the waves. Upon which all the cattle in the island, oxen, sheep, calves, swine, dogs, whelps, and every other living creature, plunged themselves with the greatest fury into the sea, and were drowned, since which time no one has inhabited the island.

OF THE HUSBANDRY OF THE ORKNEYS,

Taken from another manuscript annexed to the preceding.

They till not till the spring of the year, and as they till so they sow their oats. Their plough is drawn by four beasts going side by side. The caller, or driver, goes before the beasts backwards with a whip. The holder of the plough lies on with his side on the plough; the coulter and the sock be not two pound in weight; the oxen be yoked with chealts, and haims and breachems, which they call weassis, albeit they have horns. They sow in a creel made of straw, they call ane cassie, and of ane handful they make four casts.

Their horses live on bear-chaff, and grow exceeding fat on the same. They are very little, but quick and fiery. The men here keep the observations of the moon in so far, that they stall their marts at the waxing of the moon affirming they grow in the barrel.

Their calves never suck their mothers. Their corns are very good, to wit, bere and oats. They are handled only by the men; the women neither shake the straw, nor yet winnow the corn. They good their land with sea-ware, and lightly midden muck.

To the Editor of the Belfast Magazine.

SIR,

IT is with great satisfaction that I observe the pages of your Magazine occasionally occupied with philosophical disquisitions, on subjects connected with the arts which adorn human life. You cannot have a nobler object than that of endeavouring to introduce improvements into the several branches of useful science; and attention to the subject will justly intitle you to the thanks of a judicious and discerning public.

I am sensible, that every thing connected with philosophy and the arts has been so fully investigated by professional men of the brightest talents, that it is no easy matter to discover any thing entitled to the character of a real improvement; and that few but those who devote their lives to the study of nature can hope to have the merit of raising science to a higher pitch of perfection. But unquestionably that man is fairly entitled to the character of a philosopher, who diligently follows the footsteps of those that have successfully applied themselves to the investigation of the phenomena of the natural and moral worlds, though he may not be able, by mounting to nobler heights in the arduous paths of science, to lay claim to the highest meed of literary renown. And therefore we should not abandon philosophical pursuits, because we despair of equalling those who have gone before us. We should endeavour to improve our own minds, by the labours of others. To obtain literary fame is the happy lot but of a few—to make some progress in the several branches of useful and commercial learning, is in the power of all.

But many seem to have no natural taste for philosophical subjects, and require to have the beauties of science pointed out, and recommended to their attention. Your correspondents therefore cannot be improperly or unprofitably employed, when they endeavour to present to the view of our ingenious countrymen, sketches of the philosophy of nature in an agreeable and engaging form. Such pourtrayings of science, even though imperfectly executed, may tend to excite curiosity, to raise youthful genius to aspire after high distinction, and to promote a taste for those studies, which most contribute to the improvement of the human mind.—This position seems well illustrated by the effect which was produced on the public mind and taste by some of the writings of the Bishop of Llandaff. It is well known, that the elegant Chemical Essays of that learned and excellent philosopher, tended to inspire all ranks with a desire of making inquiries into a most delightful and useful branch of natural philosophy, and to promote a taste for chemical researches that was before unknown.

I observe in your Number for February, a paper on the subject of *specific gravity*, in which the author describes an instrument for ascertaining specific gravities which he invented, and gives a brief account of the general doctrine. As inquiries of this nature are interesting, and cannot be supposed familiar to many of your readers, I shall claim your indulgence while I make a few additional observations, with a view of making the subject as plain and intelligible as possible.

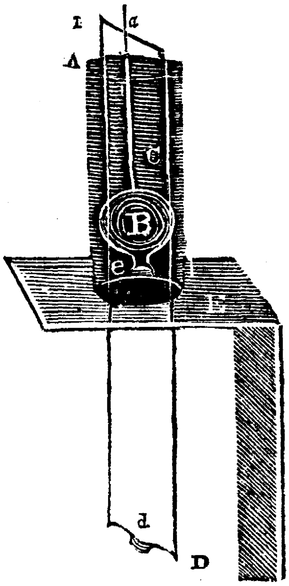
The solution of the problem respecting King Hiero's crown is the first discovery which was made respecting specific gravity. As it forms a very good explanatory introduction to the general doctrine, I shall make no apology for laying some account of it before the reader.

Hiero king of Syracuse had employed a goldsmith to make him a crown, and furnished him with a wedge of pure gold, of a certain weight, for that purpose. The crown was made, and the weight of it found correct. Yet, judging by the colour of the metal, Hiero suspected that the goldsmith had kept back part of the gold, and made up the weight by alloying the crown with some less valuable metal. But the king not knowing how to discover whether his suspicions were well founded or not, referred the matter to *Archimedes*, the most celebrated geometrician of the age. As the subject was altogether new to him, he was for some time unable to devise any method of detecting the imposition. What the philosopher was unable to accomplish by laborious study, was however discovered by means of an accidental observation.

It happened, one day, that as he was stepping into the bath, he observed that the water rose in the bath, in proportion as he descended, and was immersed to a greater depth. From this observation he took a hint, with which he was so much transported, that he jumped out of the bath, and ran about naked, crying out, in an extacy of joy, I have found it! I have found it! He concluded instantly, that on going into the bath, he had raised the water just as high as any thing else would have done, that was exactly of his bulk: and consequently considering, that any other body of equal weight but of less bulk than himself, could not have raised the water so high as he did, he immediately told the king he had discovered a method of solving the problem respecting the adulteration of the crown.—The mode which he adopted appears to have been as follows.—He procured a ball of pure gold and another of silver, exactly of equal weight with the crown, and argued thus—if the crown be altogether gold, it will be exactly of equal bulk with the ball of gold, and when immersed in water, will raise the water exactly to the same height as the ball when immersed: but if it were wholly of silver, the ball of silver when immersed would raise the water no higher than the crown immersed—and therefore if the crown consist of gold and silver mixed in a certain proportion, it will when immersed raise the water less high than the ball of silver of the same weight, and higher than the ball of gold: for gold being the heaviest of all known metals, contains greater weight under the same bulk than any other metal.—Accordingly he detected the adulteration, by finding that the crown raised the water higher, on immersion, than the ball of gold, though not so high as the ball of silver: and by making trials with different metals, he at length ascertained the quantity of alloy which the crown contained.

If, instead of marking the *heights* to which the masses of gold and silver raised the water on immersion, Archimedes had estimated their respective *weights* when immersed in water, he would have been able to have solved the problem with greater ease and exactness. For a solid immersed in a fluid loses a proportion of its weight equal to the weight of the quantity of fluid displaced. If a body be weighed in air, and then in water, the equilibrium of the balance is instantly destroyed on immersion; and the weight which restores the equilibrium is equal to the weight of a quantity of water of equal bulk with the immersed solid. Thus, if a guinea weigh, in air, 129 grains, and if, on immersion, it requires 7¼ grains added to it to restore the equilibrium, this shows, that a quantity of water equal to the bulk of a guinea weighs 7¼ grains. Now had Archimedes weighed in water the crown and gold ball, which he found of equal weight in air, he would have found that on immersion, the one was heavier than the other. The pure gold, not being equal in bulk to the mixture of which the crown was made, would have displaced a less quantity of water, and of course would have lost less of its weight than the crown; and it would thence have been apparent, that the crown had been alloyed with some metal of inferior value, and whose *specific gravity* was less than that of pure gold.

Specific gravities were formerly ascertained by an instrument called the *hydrostatic balance*, which differed from the common balance only in being of very nice construction, and having a hook at the bottom of each scale, on which small weights might be hung by horse-hairs, or silk threads. This instrument was improved, by appending to one end of the beam a glass ball for ascertaining the specific gravity of fluids, and a glass bucket for ascertaining that of solids. But latterly the form of the instrument has been entirely changed, by the attempts of various ingenious men, to reach perfection. Of the several instruments which have been contrived, that of Mr. Nicholson, as improved by Mr. Laurie of Glasgow, appears to be the best. It is termed *hydrometer*, and can very conveniently be employed both for fluids and solids. The instrument at first consisted simply of a glass ball, to which a small rod, having a little bucket or cup for containing weights was fixed at top, and likewise a small cup for the same use at bottom. One defect of this instrument was, that it was readily overset. To remedy this inconvenience, Mr. Laurie added two bars, which extend to a considerable length below the body of the instrument, and which by bearing weights, in a small cup, at the lowest part, throw the center of gravity so low, that the instrument always remains in its proper position. This will be better apprehended by a particular description.



A, E, is a glass vessel for containing water and other fluids; I, D, is a small metal frame, which encompasses the glass vessel, A, E, and has the glass ball B, connected with it, by the small metal rod *a*, c; *d*, is a small cup at the lower part of the frame, for containing weights; e, is another small cup, which is fastened to the glass ball, and which is used for the same purpose. The instrument is so constructed, that 1000 grains put into the cup *d*, shall bring down the glass ball B, till the rod *a*, c, be half immersed in the standard fluid—viz. distilled water, at the temperature of 60° Fahrenheit. The rod *a*, c, is graduated by experiments made for the purpose, so as to correspond with weights put into the cup *d*.

Let it be supposed now, that I want to know the specific gravity of any fluid. I pour a sufficient quantity of it into the vessel A, E, and mark the point of the rod *a*, c, where the fluid strikes, on the glass ball being immersed in it. This determines immediately the ratio of specific gravity between it and the standard fluid. Or, put into the cup *d* weights sufficient to bring the rod *a*, c, to the point at which it stands, when the standard fluid is employed—This determines the point as before. Suppose 900 grains produce this effect;—The ratio is as 900 to 1000—That is the specific gravity of the fluid is 9 the standard fluid being taken as 1.

But let it be required to determine the specific gravity of any solid. Pour distilled water into the vessel A, E; take the weights out of the lower scale *d*, and put in the solid, whose specific gravity is required. Admit that the solid employed is not sufficient to bring the rod *a*, c, to the zero point, and that I find 100 grains additional are necessary to produce this effect: this determines that the absolute weight of the mass is 900 grains. Take now the substance out of the scale *d*, and put it into the scale e, it loses a part of its weight, which of course is the weight of a quantity of water of equal bulk. Put weights into the lower scale, to restore the equilibrium, then the proposition is—"As the loss sustained is to the absolute weight, so is the specific gravity of the fluid to that of the solid."—Thus, a guinea weighs in air 129 grains; it loses in water 7.25; therefore 7.25 : 129 :: 1.000 . 17.793, the specific gravity of gold. The meaning of which is, that a guinea is 17.793 times as heavy as its bulk of water.

By the hydrometer I can likewise ascertain the exact proportion of metals in any compound. Suppose I wish to determine how much alloy there is in a guinea, or what proportions of copper and pure gold there are in guinea-gold. By experiment, I find the specific gravity of guinea-gold to be 17.793, and I know, by the tables, that the specific gravity of fine gold is 19.637, and that of copper 8.843. I then subtract the specific gravity of copper from that of the compound, and the specific gravity of the compound from that of gold—The first remainder shows the bulk of gold, and the latter the bulk of copper, in the whole compound—These I multiply by the respective specific gravities, and the products show the proportion of weights of each metal in the compound.

from 17.793 specific gravity of compound,
take 8.843 specific gravity of copper,
8.950 bulk of gold in the compound.

and from 19.637 specific gravity of gold,
take 17.793 specific gravity of compound,
1.844 bulk of copper in the compound.

there 8.950 × 19.637 gives 175.75 proportion of gold,
and 1.844 × 8.843 gives 16.3 proportion of copper,
Or 22 to 2 nearly.

Thus I find that in guinea-gold, for every 22 parts of pure gold there are 2 parts of copper. This experiment may be extended to any compound metal; and thus it will be easy to determine, whether a suspected metal be genuine or counterfeit.

I shall conclude this paper by remarking, that though many persons may never have occasion to make experiments respecting specific gravities, yet it must be pleasant for all to know something of the subject. An acquaintance with the general doctrine will frequently be found serviceable in reading and in conversation. At all events, inquiries of this nature form a pleasing and useful exercise for the powers of the human mind.

A. Z.